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AN ENLISTED PERFORMANCE PREDICTION MODEL FOR HULL TECHNICIANS

by

Glen Leverette

December 1983

Thesis Advisor: W.E. McGarvey

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These models predict the future fleet performance of HT personnel as measured by length of service, paygrade achieved, and recommendation for reenlistment. Other results and recommendations regarding implementation and future research are also discussed.

An Enlisted Performance Prediction Model for Hull Technicians

by

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I. INTRODUCTION

The objective of this study is to determine if assignment standards for Hull Maintenance Technicians (HT) can be improved using data that was available at the time of enlistment. Studies concerning personnel assignments to ratings have traditionally been validated against training criteria with completion of "A" School as the measure of success for validation. Other studies have been primarily concerned with attrition as the measure of success. This thesis will attempt to improve the assignment process as measured by the performance of HTs in the fleet. It should be noted that this is a duplication of an original criterion developed by Whitaire and Deitchman [Ref. 1]. Further study of enlistment standards in the assignment process has been conducted by Sandel and Gleason [Ref. 2].

The following discussion provides a brief overview of the HT rating.

Hull Maintenance Technicians do the metalwork and carpentry rquired to keep all types of shipboard structures and surfaces in good condition. They also take care of ship plumbing and ventilation systems, repair ships small boats, and perform firefighting and damage control duties.

Hull Maintenance Technicians repair decks, structures and hulls using such techniques as welding, soft soldering,

riveting and caulking. This involves working with both light and heavy gauge metals including aluminum, stainless steel, sheet brass, sheet copper, steel plates and sheet and corrugated iron. They heat-treat metals to control expansion and contraction and use hot and cold forming techniques. They lay out and fabricate various metal forms and connector pieces such as funnels and elbows; they make flanges, metal patches and metal tubing.

In the area of carpenty, HT's repair wooden structures such as gangways, platforms and gratings; they replace deck coverings and deck treads, and they finish and seal wooden surfaces using stains, paint and other finishing materials.

Steamfitting and plumbing duties include clearing systems blocks, installing, repairing or replacing salt-and fresh-water lines, steam piping, steam traps, fuel piping, flushing systems and gravity drains.

In addition to repairing and servicing ventilation and sprinkling systems, HT's are in charge of the maintenance and storage of portable emergency tools and equipment. They inspect, test and maintain fire stations; they periodically inspect, recharge and weigh portable carbon dioxide and dry chemical fire extinguishers; and they test/operate permanently installed fire control systems. After fires, they operate blower equipment to clear smoke, and other equipment to take up excess water or other extinguishing material. They conduct post-fire checks for gas presence and adequate oxygen supply.

In damage control efforts during and after shipboard emergencies, HT's make repairs to protect against water leaks and to ensure ship stability and moment (balance) in the water.

Hull Maintenance Technicians are assigned to all types of ships and their work assignments take them to all parts of the ship. Ashore, they are assigned to training centers, repair facilities and other sites where their special skills are needed. Much of their work aboard ship is performed in engineering spaces where the temperatures are very warm and the noise level is high.

Hull Maintenance Technicians spend approximately 10-12 years on sea duty during a 20 year enlistment in the Navy. The remaining 8-10 years of the 20 year period in the Navy will be spent on shore duty providing support for fleet units. Navy women in the HT rating generally work at shore facilities in the United States and overseas.

While previous training and experience are not required, HT's need good mechanical aptitude, good general learning ability, and a knowledge of practical arithmetic. They should be self-reliant individuals who can remain calm in emergencies and act quickly under stress. Individuals may qualify for the HT rating through on-the-job experience, personal study, or by attending a service school [Ref. 3].

Considering the increasing costs of the all volunteer force, both in equipment and manpower, in conjunction with

a projected increase in fleet size to 600 ships, there appears to be an obvious need to study and improve assignment techniques and enlistment standards.

Thomason [Ref. 4] found that first term attrition is significantly different among Navy recruits and is a function of initial rating assignment. In light of the reasons previously mentioned this finding indicates that further research and study in the area of assignment procedures and techniques is desirable. Improvement in selection processes and assignment techniques, it is assumed, should result in higher retention, higher state of readiness, lower training costs, and a more capable, experienced Naval force.

II. LITERATURE SEARCH RESULTS

A. SUMMARY OF PREDICTOR VARIABLES

The following is a summary of the studies on enlistment standards and assignment processes that predict the future fleet performance of selected Navy ratings.

Bond [Ref. 5] developed three distinct models as predictors of ET enlistment performance for three different cohorts in the ET rating. Of the nine variables used in the development of the models, months in the delayed entry program, age of individual at the time of entry, and marital status were predictor variables in each model. Number of dependents, a variable in the ETNF and ETAEF cohort models, was also used to predict the performance of the ETN rating in a study conducted by Lurie [Ref. 6]. The models developed by Bond tended to be of more value in assessing chances of failure rather than success in the ET rating.

Snyder and Bergazzi [Ref. 7] in a study of enlistment standards to predice "success" in the Boiler Technician (BT) and Machinist's Mate (MM) (non-nuclear) ratings concluded that for an individual with no preference between either the BT or MM rating, Asvab Aptitude Area Scoree--Subscale NO and Asvab Aptitude Area Score--Subscale MK were discriminating variables for each rating. Additionally, the difference between these two scores was statistically

significant. They stipulated that a recruiter should closely review the scores of these two Asvab subtests for a recruit who desired either rating, but indicated no preference. For the recruit who wanted to be either a BT or MM, Highest Year of Education Completed and Asvab Aptitude Area Score--Subscale NO were the principal variables that predicted "success" in the BT and MM rating.

Whitmire and Deitchman [Ref. 1] concluded that the results of their study of success and failure predictors for the Aviation Structural Mechanic rating (AM) indicated potential for substantial improvement in the Navy's initial assignment of individuals to the AM rating. Variables used in their AM model were Term of Enlistment (no. of years), Marital Status (1, other, 2, married), Asvab Aptitude Area Score--Subscale GS, Highest Year of Education Completed, Asvab Aptitude Area Score--Subscale NO, Asvab Aptitude Area Score--Subscale AI, Number of Dependents (1, none), Armed Forces Qualification Test Percentile, and Asvab Aptitude Area Score--Subscale MK.

Gleason and Sandel [Ref. 2] in a study of enlistment standards for the Aviation Antisubmarine Warfare Technician (AX) and Aviation Antisubmarine Warfare Operator (AW) found that, in the case of the AX model, only a 4% improvement in selection over the current process was realized. Further, the high false success assignment rate of the AW model did not improve the selection rate for the AW rating. The

conclusion of the study was that the variables used in the study did not improve the Navy's current process of assigning individuals to the AX and AW ratings.

Wardlaw [Ref. 8], in an analysis investigating the selection of recruits entering the Navy for the Operations Specialist rate (OS), found that the variables Marital Status (1, other 2, married), Asvab Aptitude Area Score--Subscale GI, Asvab Aptitude Area Score--Subscale WK, Asvab Aptitude Area Score--Subscale EI, Asvab Aptitude Area Score--Subscale MC, Asvab Aptitude Area Score--Subscale AR, and Highest Year of Education Completed provided cross-validation sample hit rates that exceeded the Navy's selection rates in the development of an OS prediction model. While Wardlaw's definition of success, achieved paygrade E-4 or above in less than four years and recommended for reenlistment, and definition of failure, did not make E-4 and not recommended for reenlistment, are different from those used in this study, the model should provide a reasonable prediction tool for success and a very good prediction model for failure in the OS rating. Wardlaw's model provided a 6.33% and 17.85% improvement in classification rates for success and failure respectively.

In a study of selection standards for the Ships Serviceman, Personnelman, and Aviation Technician ratings, Nesbitt [Ref. 9] developed stepwise regressions on length-of-service criterion which supported the hypothesis that entry age,

educational level, and ability tests would be significant predictors of performance. Validity coefficients were large enough to suggest that the predictor equations were sufficiently powerful to improve selection on the three criteria. Stepwise regression equations were developed for different combinations of variables selected to predict "goodguy" and "badguy" performance for whites and blacks in each of the ratings. Nesbitt's study did not provide a general classification model for each of the ratings, which would have resulted from the use of discriminant analysis in the research.

A summary of the predictor variables used in these studies is provided in Table I. All of the variables used indicate that the personal and background attributes of individuals are crucial factors in the assignment process. It is felt that the results of this study may provide improved information to Navy recruiters regarding the type of individuals they should recruit to fill billet requirements in the HT rating.

B. DEFINITION OF CRITERION VARIABLES

Based upon these and other research efforts this study defines "success" as:

1. Completed 3.9 years of the initial term of enlistment,
2. Achieved paygrade E-4, and
3. Recommended for reenlistment.

Category 1 in the various tables and matrices presented denotes the "success" category.

"Failure" is achieved in this study if either of the following measures are met:

1. Failed to complete an enlistment,
2. Failed to be recommended for reenlistment,
3. Failed to achieve paygrade E-4.

Category 2 in the various tables and matrices denotes the "failure" category.

These two categories, "success" and "failure", while defined in such a manner to facilitate use by recruiters as measures of actual fleet performance, are mutually exclusive but do not account for all of the Hull Maintenance Technicians in the data set. Tables II and VIII show the frequency distributions of individual membership in the two categories.

173 individuals were excluded from analysis of those individuals initially assigned to the HT rating and 225 individuals were excluded from analysis of those who were subsequently assigned to the HT rating. These individuals were not included in the study because they fell into a "grey area" between the two criterion categories. The "grey area" is composed of individuals who only attained paygrade E3 or less, but had been recommended for reenlistment in the Naval Service. Attainment of paygrade E3 during the first 3.9 years of the initial term of enlistment is not considered adequate justification for classification in the

failure category. However, these personnel did not represent the type of individual performance this study attempts to predict. Further, some individuals in the "grey area", may be categorized as "system failures" in that their inability to completely satisfy "success" criteria could be attributable to Navy promotion policies for the HT rating, rather than individual failure.

Further explanation of the success definition is required. Completion of three years, nine months of service was selected as a measure of success in order to allow all personnel in the data base to qualify for eligibility in the success category. This was necessary because the data were updated only as recently as October 1982, which would exclude some 1978 entrants from meeting all three measures of success. This could result in a number of successful personnel being classified as failures. However, some failures could also have been classified as successes. Secondary analysis suggested that after changing from completion of three years, nine months of service to completion of four years, as a measure of success, 765 observations that were originally classified as successful dropped to the failure category. Consequently, 12.5% of the 6077 observations in the data base would have been classified as failures using completion of four years of service as a measure of success. Therefore, in order to facilitate inclusions of the 1978 cohort in the analysis,

with an opportunity to qualify for eligibility in the successful category, three years nine months was substitued in place of a four year enlistment without appreciable loss of prediction accuracy.

III. STATISTICAL TECHNIQUES

The following is a brief description of the statistical procedures used and how they were applied in this analysis.

1. Frequency analysis: Frequency distributions give a count of how frequently each value of the variables occurs among the data sets. In this study frequency analysis was performed to provide the counts of "success" and "failure" as well as the counts for each predictor variable used in the models. Results are contained in Tables II through VII for those individuals who began their enlistment as HT's and Tables VIII through XII for those individuals subsequently assigned to the rating.
2. Multivariate Correlation Analysis. Through the use of this procedure the relationships between the variables have been studied. Causal interpretation can not be made safely but as a descriptive tool, correlation analysis has potential for predicting values on one variable given information on another variable. A summary measure that communicates the extent of positive linear relationship or correlation of a set of predictor variables with a criterion variable is called a multiple correlation coefficient, denoted by "R".

3. Stepwise Discriminant Analysis. Given a set of predictor variables it is not necessary to utilize every one in the determination of a multiple R2. So one begins by selecting the one predictor variable that correlates most highly with the criterion variable and then introduces as a second predictor variable, the one that accounts for the most of the residual variance in the criterion variable. Variables are continually added until inclusion of another predictor variable would account for only an insignificant amount of variance in the criterion variable.
4. Discriminant Analysis. Discriminant analysis is a procedure for identifying whether quantitative values on various predictor variables are related to values of a categorical variable. The results present a tabulation of the object's actual group membership versus their predicted group membership. In order to predict membership of each individual in one of the criterion groups, discriminant analysis develops a model using the predictor variables shown to have high correlation with the criterion variables. This is accomplished by development of a cut-off score which is the weighted sum of the predictor values. Probability of group membership is assigned based on the sum of these weighted values. Individuals' are assigned to the group for which their observations have the highest probability.

Discriminant analysis uses a prior probability of group membership when assigning predicted group membership. Discriminant Analysis offers the option of assigning either actual or equal values to the prior probabilities of membership in the criterion categories. Actual probability is based on the frequency distributions in the sample. Prior knowledge of group membership increases the chance of the discriminant analysis procedure correctly assigning individuals into categories based on new predictor variables. This study uses the actual proportions of success and failure of the sample groups. This is felt to be appropriate since the objective of this thesis is to improve on the current selection process. It is understood that all individuals in the study have been screened and were selected based on their meeting the eligibility requirements of the HT rating.

IV. MODELS

Two separate models were created for those individuals assigned to the HT ratings. A general discussion of model development for both models will be given followed by a separate discussion of each model.

Each data base for the HT rating was separated through a random sample process into two subsets. Deriv8 and Valid8. For each model Deriv8 was used strictly for analysis purposes and Valid8 was used for validation.

A frequency analysis of group membership in the success and failure categories was conducted on both data bases to determine the accuracy of the Navy's current assignment process. The success rate for those initially assigned as HT's was 60.8% and for those who were subsequently assigned to the HT rating, the success rate was 70.9%. Considering these percentages, the models developed in this study would have to have higher success rates if they are to be included in an improved assignment process.

In computing the actual models two basic statistical procedures, stepwise discriminant and discriminant analyses were used.

A. MODEL 1

The stepwise discriminant analysis identified five variables that best explained the differences between the

success and failure categories; Screen, Entry Pay Grade (E00--O11) AFQT Percentile, Standardized Asvab Aptitude Area Score--Subscale NO, and Standardized Asvab Aptitude Area Score--Subscale MC. Of the five variables, Screen had the highest r^2: .0327, that is it explained 3.27% of the difference between the two categories. See Table XIII.

Correlations between the five predictor variables selected by the stepwise discriminant analysis procedure were sufficiently low to eliminate multicollinearity as an issue in the study. It is also considered noteworthy that while previous studies on enlistment standards used raw Asvab Subtest scores, in this study, Asvab Subtest scores were recoded to facilitate use of standardized Asvab Subtest scores which are currently used in the Navy's assignment process. The recode procedure would permit the models developed in this study to be used in the recruiting command without the requirement to standardize raw Asvab test scores.

Using prior probabilities of 61% and 39%, for category 1 and category 2 respectively, a discriminant analysis was run using the five predictor variables identified in the stepwise discriminant analysis. The results of the discriminant analysis are shown in Table XIV. The positions shown in the discriminant matrix are as follows:

1. (1,1) The number and percentage of successful individuals correctly assigned to the successful category. "True Positives"

2. (1,2) The number and percentage of individuals assigned to the unsuccessful category who were actual successes. "False Negatives"
3. (2,1) The number and percentage of unsuccessful individuals incorrectly classified as successful. "False Positives"
4. (2,2) The number and percentage of failures correctly classified. "True Negatives"

The predictive ability of the model is described by its "hit rate". The total "Hit Rate" is the percentage of correct classifications divided by the total number of classifications made. The analysis produced a hit rate of 66.9% for the model derivation run and 65.4% for the validation run.

The results show that the model would correctly assign 6.1% more individuals to the HT rating than the Navy's current assignment process. Although a 6.1% increase in the number of individuals that were correctly assigned to the success category is considered to be an improvement, the relatively small percentage of unsuccessful individuals that were incorrectly classified as successful also tended to add credibility to the model.

B. MODEL 2

Seventeen variables were initially selected for inclusion in the stepwise discriminant analysis for Model 2. Four variables: Screen Score, AFQT Percentile, Entry Paygrade

(E00--O11), and Race were identified as the predictor variables. Since the primary objective of this study is to select variables that can realistically be used in the assignment process to predict future fleet performance, it is the opinion of the author that in assigning individuals to the HT rating (or any Navy rating), using race as a selection crition is inappropriate. There are substantial social, moral, legal, and political issues that could result from attempts by the Navy to attain certain racial balances within a rating based upon the higher probability of success in the rating of a particular ethnic or racial group. Therefore, race was deleted from the analysis and a subsequent stepwise discriminant analysis selected Screen Score, AFQT Percentile, Standardized Asvab Aptitude Area Score--Subscale SI, and Entry Paygrade (Eoo--O11) as the predictor variables for Model 2. Multicollinearity was not an issue because the between variable sample correlations were not sufficiently high. A stepwise selection summary is shown in Table XV.

Model 2 produced a hit rate of 71.2% for the model and 71.7% for the validation run which, considering the Navy's success rate of 70.9%, indicated only negligible improvement. However, this model, in both the model and validation runs, failed to correctly classify any individuals who were unsuccessful (see Table XVI).

In view of the fact that both the Navy's success rate and the hit rate for Model 2 were approximately 10% higher

than the success rate for Model 1 and the inability of Model 2 to correctly classify failure, additional analyses of group 2 membership was performed. A frequency distribution of the variable Rcpgscrt (recruit program/school rate), which identifies the occupation rate in which an enlistment is made (Table XVII) showed that of the 3081 individuals who were not assigned to the HT rating at enlistment, recruit program school rate codes were not reported for 1910 cases and 30 cases were assigned missing values. Individuals were assigned to the HT rating from a variety of source ratings. Further, 28.5% of these individuals enlisted and were assigned the occupational speciality code "OR" (mechanical specialities; fabrication). Acceptance of this occupation specialty implies motivational interest in the HT rating.

As a result of the large number of individuals (1910) for whom recruit program/school rate codes were not reported and the lack of data on individuals who may have met the criterion for success (as defined in this study) prior to being assigned to the HT rating, it is likely that the inability of model 2 to classify failures correctly may be attributed to data distortion. That is, the probability of being classified as successful may be artificially high as a result of those individuals subsequently assigned to the HT rating who met the success criterion of this study in their "old" rating.

Additional discriminant analyses were run using different values for prior probabilities instead of the .71 and .29

probabilities of success and failure attained from the sample data. The results of Table XVIII show that by using probability combinations of .50 and .50, .60 and .40, .61 and .39 (prior probabilities used in Model 1), .65 and .35, and .70 and .30, a positive relationship can be shown to exist between prior probabilities of success and failure and the ability of the model to correctly classify individuals in these two categories. That is, the higher the prior probability an individual has of being successful, the propensity of the model to classify that individual in the successful category also increases. Therefore, because of possible data bias, deemed attributable to the result of those individuals subsequently assigned to the HT rating who may have met the success criterion of this study before assignment to the rating, the predictive power of Model 2 is questionable.

While Model 2 was unable to correctly predict failure of those individuals who were not initially assigned to the HT rating, the differential that exists between the Navy's actual success rates within the rating substantiate the two model approach used in this study.

V. CONCLUSIONS

The results of both models indicate that improvement can be made over the Navy's current assignment process for Ht's. For those individuals assigned to the HT rating at the beginning of their enlistment, Model 1 offers measurable improvement (6.1%) in the ability of Navy recruiters to predict the success or failure, as defined in this study, of individuals prior to their assignment to the HT rating.

Because Model 2 offered only negligible improvement to the current assignment process, its use as a selection process alternative is not deemed feasible. In order for an enlistment standards model to be considered in the assignment process, it must not only be able to predict success, but failure also. The inability of Model 2 to correctly classify failure for those who were not assigned to the HT rating at the beginning of their enlistment severely limits its use as a predictive instrument.

Given the relatively high percentages of individuals correctly classified as successful in Model 2 and the Navy's high success rate for individuals who were not initially assigned to the HT rating, the 10% differential that exists between the actual Navy success rates for both groups is best explained by the assumption that some of the individuals who were subsequently assigned to the HT rating may have

been successful in their source ratings which would tend to artificially inflate the Navy's actual HT success rate.

Given that 51.4% of the HT's in this study did not begin their enlistment in the HT rating, a careful review of the assignment procedures for individuals who are not assigned to the HT rating at the time of enlistment could be made to determine what selection criteria are being used and the extent of their applicability to the initial assignment process.

Considering the definitions of success and failure used in this study and the data available at the time of enlistment, the Navy is adequately screening individuals for the HT rating. However, use of the variables provided in Model 1 would enhance the assignment process for those individuals who were selected to begin their enlistment in the HT rating.

APPENDIX A

TABLES

TABLE I

Summary of Predictor Variables

Author(s)	Rating(s)	Variables
Bond	ET	Months in Delayed Entry Program, Number of Dependents, Age of Individual at time of Entry, Waiver Required, Asvab Aptitude Area Score Subscales AI, NO, EI, and MK, Martial Status
Snyder and Bergazzi	BT	Highest year of Education Completed, Asvab Aptitude Area Score--Subscales WK, MK, GI, AR, and NO, Age of Individual at time of Entry
	MM	Highest Year of Education Completed, Age of Individual at time of Entry, Asvab Aptitude Area Score--Subscales GI, NO, WK, and MI
Whitmire and Deitchman	AM	Term of Enlistment, Martial Status, Highest Year of Education Completed, Number of Dependents, AFQT Percentile Asvab Aptitude Area SCore--Subscales NO, AI, GS, and MK
Gleason and Sandel	AX	Screen Score, Entry Paygrade, Asvab Aptitude Area Score--Subscales GI, and NO
	AW	Screen Score, Entry Paygrade, Asvab Aptitude Area Score--Subscales AR, and MK
Wardlaw	OS	Martial Status, Highest Year of Education Completed, Asvab Aptitude Area Score--Subscales GI, MK, EI, MC, AR, and MK

TABLE II

Frequency Distribution of Initial HT's

C1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	173	.	.	.
1	1664	1664	60.863	60.863
2	1070	2734	39.137	100.000

TABLE III

Screen Score

SCREEN	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	188	.	.	.
57	2	2	0.074	0.074
59	1	3	0.037	0.110
62	2	5	0.074	0.184
63	3	8	0.110	0.294
66	14	22	0.515	0.809
68	16	38	0.588	1.398
70	49	87	1.802	3.200
71	10	97	0.368	3.567
72	84	181	3.089	6.657
73	1	182	0.037	6.694
74	72	254	2.648	9.342
75	2	256	0.074	9.415
76	41	297	1.508	10.923
77	73	370	2.685	13.606
78	85	455	3.126	16.734
79	190	645	6.988	23.722
80	17	662	0.625	24.347
81	43	705	1.581	25.929
82	118	823	4.340	30.268
83	291	1114	10.702	40.971
84	125	1239	4.597	45.568
86	32	1271	1.177	46.745
87	204	1475	7.503	54.248
88	598	2073	21.993	76.241
89	63	2136	2.317	78.558
90	536	2672	19.713	98.271
91	6	2678	0.221	98.492
92	12	2690	0.441	98.933
93	9	2699	0.331	99.264
94	2	2701	0.074	99.338
95	15	2716	0.552	99.890
96	3	2719	0.110	100.000

TABLE IV

Entry Pay Grade (E00--011)

ENTRPAYG	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1	2320	2320	79.807	79.807
2	315	2635	10.836	90.643
3	272	2907	9.322	100.000

TABLE V

AFQT Percentile (or equivalent)

AFQTPCNT	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	23	23	0.791	0.791
7	1	24	0.034	0.826
9	1	25	0.034	0.860
11	1	26	0.034	0.894
14	3	29	0.103	0.998
15	2	31	0.069	1.066
16	2	33	0.069	1.135
17	4	37	0.138	1.127
18	10	47	0.344	1.617
19	15	62	0.516	2.133
21	23	85	0.791	2.924
23	34	119	1.170	4.094
25	25	144	0.860	4.954
26	1	145	0.034	4.988
27	45	190	1.548	6.536
29	48	238	1.651	8.187
30	3	241	0.103	8.290
31	67	308	2.305	10.595
33	64	372	2.202	12.797
35	74	446	2.546	15.342
36	1	447	0.034	15.377
37	5	452	0.172	15.549
38	92	544	3.165	18.713
39	2	546	0.069	18.782
40	1	547	0.034	18.817
41	99	646	3.406	22.222
42	8	654	0.275	22.497
43	5	659	0.172	22.669
44	118	777	4.059	26.729
45	4	781	0.138	26.866
46	6	787	0.206	27.073
47	117	904	4.025	31.097
48	12	916	0.413	31.510
49	5	921	0.172	31.682
50	139	1060	4.782	36.464
52	3	1063	0.103	36.567
53	121	1184	4.162	40.729
54	4	1188	0.138	40.867
55	7	1195	0.241	41.108
56	134	1329	4.610	45.717
57	8	1337	0.275	45.992
58	135	1472	4.644	50.636
59	8	1480	0.275	50.912
60	142	1622	4.885	55.796
61	2	1624	0.069	55.865
62	121	1745	4.162	60.028
63	10	1755	0.344	60.372
64	9	1764	0.310	60.681
65	138	1902	4.747	65.428

Table V Continued

67	92	1994	3.165	68.593
68	4	1998	0.138	68.731
69	5	2003	0.172	68.903
70	99	2102	3.406	72.308
71	4	2106	0.138	72.446
72	118	2224	4.059	76.505
73	7	2231	0.241	76.746
75	97	2328	3.337	80.083
77	95	2423	3.268	83.351
78	4	2427	0.138	83.488
80	71	2498	2.442	85.931
82	79	2577	2.718	88.648
83	2	2579	0.069	88.717
84	76	2655	2.614	91.331
85	3	2658	0.103	91.434
86	63	2721	2.167	93.602
87	49	2770	1.686	95.287
88	3	2773	0.103	95.390
89	32	2805	1.101	96.491
90	1	2806	0.034	96.526
91	38	2844	1.307	97.833
93	25	2869	0.860	98.693
95	13	2882	0.447	99.140
97	14	2896	0.482	99.622
98	5	2901	0.172	99.794
99	6	2907	0.206	100.000

TABLE VI

Sasvab Aptitude Area Score--Subscale NO

SASVABNO	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	34	.	.	.
20	17	17	0.592	0.592
22	1	18	0.035	0.627
25	1	19	0.035	0.661
26	4	23	0.139	0.801
27	1	24	0.035	0.835
29	6	30	0.209	1.044
30	4	34	0.139	1.183
31	5	39	0.174	1.357
32	10	49	0.348	1.706
33	17	66	0.592	2.297
34	20	86	0.696	2.993
35	31	117	1.079	4.072
36	33	150	1.149	5.221
37	34	184	1.183	6.404
38	40	224	1.392	7.797
39	49	273	1.706	9.502
40	56	329	1.949	11.451
41	60	389	2.088	13.540
42	59	448	2.054	15.593
43	91	539	3.167	18.761
44	90	629	3.133	21.893
45	101	730	3.515	25.409
46	113	843	3.933	29.342
47	148	991	5.151	34.494
48	136	1127	4.734	39.227
49	159	1286	5.534	44.762
50	133	1419	4.629	49.391
51	124	1543	4.316	53.707
52	134	1677	4.664	58.371
53	142	1819	4.943	63.314
54	177	1996	6.161	69.474
55	107	2103	3.724	73.199
56	107	2210	3.724	76.923
57	96	2306	3.341	80.265
58	100	2406	3.481	83.745
59	88	2494	3.063	86.808
60	57	2551	1.984	88.792
61	67	2618	2.332	91.124
62	45	2663	1.566	92.691
63	39	2702	1.357	94.048
64	36	2738	1.253	95.301
65	23	2761	0.801	96.102
66	34	2795	1.183	97.285
67	29	2824	1.009	98.294
68	18	2842	0.627	98.921
69	31	2873	1.079	100.000

TABLE VII

Sasvab Aptitude Area Score--Subscale MC

SASVABMC	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	37	.	.	.
25	39	39	1.359	1.359
30	1	40	0.035	1.394
34	1	41	0.035	1.429
37	5	46	0.174	1.603
39	16	62	0.557	2.160
41	31	93	1.080	3.240
43	72	165	2.509	5.749
46	149	314	5.192	10.941
48	233	547	8.118	19.059
50	333	880	11.603	30.662
53	353	1233	12.300	42.962
55	375	1608	13.066	56.028
57	385	1993	13.415	69.443
60	282	2275	9.826	79.268
62	217	2492	7.561	86.829
64	188	2680	6.551	93.380
66	107	2787	3.728	97.108
69	52	2839	1.812	98.920
71	31	2870	1.080	100.000

TABLE VIII

Frequency Distribution of Subsequent HT's

C1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	225	.	.	.
1	2025	2025	70.903	70.903
2	831	2856	29.097	100.000

TABLE IX

Screen Score

SCREEN	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	74	.	.	.
52	1	1	0.033	0.033
57	5	6	0.166	0.200
59	5	11	0.166	0.366
61	3	14	0.100	0.466
62	11	25	0.366	0.831
63	14	39	0.466	1.297
64	7	46	0.233	1.530
66	60	106	1.995	3.525
68	83	189	2.760	6.285
70	102	291	3.392	9.677
71	31	322	1.031	10.708
72	176	498	5.853	16.561
73	14	512	0.466	17.027
74	167	679	5.554	22.581
75	45	724	1.497	24.077
76	90	814	2.993	27.070
77	117	931	3.891	30.961
78	165	1096	5.487	36.448
79	217	1313	7.216	43.665
80	128	1441	4.257	47.922
81	92	1533	3.060	50.981
82	100	1633	3.326	54.307
83	390	2023	12.970	67.276
84	98	2121	3.259	70.535
85	1	2122	0.033	70.569
86	18	2140	0.599	71.167
87	135	2275	4.490	75.657
88	408	2683	13.568	89.225
89	28	2711	0.931	90.156
90	268	2979	8.913	99.069
91	4	2983	0.133	99.202
92	9	2992	0.299	99.501
93	6	2998	0.200	99.701
95	9	3007	0.299	100.000

TABLE X

Entry Pay Grade (E00--011)

ENTRPAYG	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
1	2736	2736	88.802	88.802
2	198	2934	6.426	95.229
3	136	3070	4.414	99.643
4	9	3079	0.292	99.935
5	1	3080	0.032	99.968
6	1	3081	0.032	100.000

TABLE XI

AFQT Percentile (or equivalent)

AFQTPCNT	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
0	33	33	1.071	1.071
1	1	34	0.032	1.104
5	1	35	0.032	1.136
6	1	36	0.032	1.168
7	2	38	0.065	1.233
9	3	41	0.097	1.331
10	1	42	0.032	1.363
11	1	43	0.032	1.396
12	1	44	0.032	1.428
13	3	47	0.097	1.525
14	38	85	1.233	2.759
15	33	118	1.071	3.830
16	37	155	1.201	5.031
17	55	210	1.785	6.816
18	55	265	1.785	8.601
19	56	321	1.818	10.419
21	86	407	2.791	13.210
23	85	492	2.759	15.969
25	75	567	2.434	18.403
27	99	666	3.213	21.616
29	105	771	3.408	25.024
30	2	773	0.065	25.089
31	98	871	3.181	28.270
33	95	966	3.083	31.353
35	105	1071	3.408	34.761
36	1	1072	0.032	34.794
37	6	1078	0.195	34.989
38	125	1203	4.057	39.046
39	6	1209	0.195	39.241
41	118	1327	3.830	43.070
42	2	1329	0.065	43.135
43	5	1334	0.162	43.298
44	139	1473	4.512	47.809
45	7	1480	0.227	48.036
46	5	1485	0.162	48.199
47	152	1637	4.933	53.132
48	9	1646	0.292	53.424
49	4	1650	0.130	53.554
50	154	1804	4.998	58.552
52	8	1812	0.260	58.812
53	129	1941	4.187	62.999
54	6	1947	0.195	63.194
55	8	1955	0.260	63.453
56	112	2067	3.635	67.089
57	7	2024	0.227	67.316
58	109	2183	3.538	70.854
59	2	2185	0.065	70.919
60	96	2281	3.116	74.034
61	4	2285	0.130	74.164
62	90	2375	2.921	77.085
63	2	2377	0.065	77.150
64	5	2382	0.162	77.313
65	103	2485	3.343	80.656
66	2	2487	0.065	80.721
67	93	2580	3.019	83.739

Table XI Continued

68	2	2582	0.065	83.804
69	6	2588	0.195	83.999
70	75	2663	2.434	86.433
71	6	2669	0.195	86.628
72	55	2724	1.785	88.413
73	3	2727	0.097	88.575
74	2	2729	0.065	88.575
75	55	2784	1.785	90.360
77	42	2826	1.363	91.723
78	2	2828	0.065	91.788
79	2	2830	0.065	91.853
80	52	2882	1.688	93.541
81	1	2883	0.032	93.574
82	41	2924	1.331	94.904
83	2	2926	0.065	94.969
84	27	2953	0.876	95.846
85	2	2955	0.065	95.910
86	33	2988	1.071	96.981
87	23	3011	0.747	97.728
88	2	3013	0.065	97.793
89	18	3031	0.584	98.377
91	17	3048	0.552	98.929
93	15	3063	0.487	99.416
94	1	3064	0.032	99.448
95	8	3072	0.260	99.708
97	4	3076	0.130	99.838
98	2	3078	0.065	99.903
99	3	3081	0.097	100.000

TABLE XII

Sasvab Aptitude Area Score--Subscale SI

SASVABSI	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
.	28	.	.	.
20	177	177	5.798	5.798
23	3	180	0.098	5.896
25	4	184	0.131	6.027
28	4	188	0.131	6.158
30	11	199	0.360	6.518
32	11	210	0.360	6.878
35	21	231	0.688	7.566
37	34	265	1.114	8.680
39	57	322	1.867	10.547
42	85	407	2.784	13.331
44	106	513	3.472	16.803
46	151	664	4.946	21.749
48	192	856	6.289	28.038
51	263	1119	8.614	36.652
53	359	1478	11.759	48.411
55	379	1857	12.414	60.825
58	400	2257	13.102	73.927
60	380	2637	12.447	86.374
62	295	2932	9.663	96.037
65	121	3053	3.963	100.000

TABLE XIII

Stepwise Discriminant Analysis Summary - Model 1

Step	Variable Entered	Variable Removed	Number In	Partial R**2	F Statistic
1	Screen		1	0.0327	56.381
2	Entrpayg		2	0.0088	14.826
3	Afqtpcnt		3	0.0041	6.802
4	Sasvabno		4	0.0013	2.156
5	Sasvabmc		5	0.0013	2.175

TABLE XIV

Discriminant Analysis Results

Model 1
(Data: Work.Deriv8)

From C1	1	2	Total
.	91 81.25	21 18.75	112 100.00
1	1039 93.44	73 6.56	1112 100.00
2	496 81.05	116 18.95	612 100.00
Total Percent	1626 88.56	210 11.44	1836 100.00
Priors	0.6450	0.3550	
	Hit Rate: 66.9%		
	(Data: Work.Valid8)		
.	41 80.39	10 19.61	51 100.00
1	458 92.53	37 7.47	495 100.00
2	233 81.47	53 18.53	286 100.00
Total Percent	732 87.98	100 12.02	832 100.00
Priors	0.6450	0.3550	
	Hit Rate: 65.4%		

TABLE XV

Stepwise Discriminant Analysis Summary - Model 2

Step	Variable Entered	Variable Removed	Number In	Partial R**2	F Statistic
1	Screen		1	0.0037	6.853
2	Afqtpcnt		2	0.0084	15.489
3	Sasvabsi		3	0.0014	2.620
4	Entrpayg		4	0.0013	2.464

TABLE XVI

Discriminant Analysis Results

Model 2
(Data: Work.Deriv8)

From C1	1	2	Total
.	138 100.00	0 0.00	138 100.00
1	1365 99.85	2 0.15	1367 100.00
2	549 100.00	0 0.00	549 100.00
Total Percent	2052 99.90	2 0.10	2054 100.00
Priors	0.7135	0.2865	

Hit Rate: 71.2%

(Data: Work.Valid8)

	1	2	Total
.	83 100.00	0 0.00	83 100.00
1	604 100.00	0 0.00	604 100.00
2	238 100.00	0 0.00	238 100.00
Total Percent	925 100.00	0 0.00	925 100.00
Priors	0.7135	0.2865	

Hit Rate: 71.7%

TABLE XVII

Recruit Program/School Rate

RATING	RCPGSCRT	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
		30	.	.	.
	-	1910	1910	62.602	62.602
QM	0200	10	1920	0.328	62.930
SM	0250	2	1922	0.066	62.996
OS	0300	3	1925	0.098	63.094
EW	0350	2	1927	0.066	63.160
ST	0400	1	1928	0.033	63.192
OT	0450	2	1930	0.066	62.258
TM	0500	3	1933	0.098	63.356
GM	0600	8	1941	0.262	63.318
GMM	0601	1	1942	0.033	63.651
GMT	0602	1	1943	0.033	63.684
GMG	0604	5	1948	0.164	63.848
FT	0800	2	1950	0.066	63.913
FTG	0801	1	1951	0.033	63.946
MT	0810	1	1952	0.033	63.979
ET	1000	5	1957	0.164	64.143
ETR	1002	1	1958	0.033	64.176
RM	1500	11	1969	0.361	64.536
CTT	1611	1	1970	0.033	64.659
CTA	1622	3	1973	0.098	64.667
CTO	1644	1	1974	0.033	64.700
CTR	1655	2	1976	0.066	64.766
YN	1700	2	1978	0.066	64.831
SK	2000	1	1979	0.033	64.864
MS	2200	2	1981	0.066	64.930
SH	2490	3	1984	0.098	65.028
MM	3700	4	1988	0.131	65.159
EN	3800	3	1991	0.098	65.257
MR	3900	4	1995	0.131	65.388
BT	4000	13	2008	0.426	65.814
EM	4100	22	2030	0.721	66.536
IC	4200	3	2033	0.098	66.634
PM	4600	2	2035	0.066	66.699
CE	5300	6	2041	0.197	66.896
EO	5410	1	2042	0.033	66.929
SW	5700	1	2043	0.033	66.962
AV	6180	1	2044	0.033	66.994
AD	6200	1	2045	0.033	67.027
ADJ	6206	1	2046	0.033	67.060
AT	6300	7	2053	0.229	67.289
AW	6400	1	2054	0.033	67.322
AO	6500	6	2060	0.197	67.519
AB	6700	2	2062	0.066	67.584
ABE	6704	1	2063	0.033	67.617

Table XVII Continued

AE	6800	11	2074	0.361	67.978
AM	6900	2	2076	0.066	68.043
AS	7500	1	2077	0.033	68.076
HM	8000	7	2084	0.229	68.305
DT	8300	2	2086	0.066	68.371
OA	9910	9	2095	0.295	68.666
OB	9911	3	2098	0.098	68.764
OD	9913	1	2099	0.033	68.797
OE	9914	1	2100	0.033	68.830
OJ	9919	17	2117	0.557	69.387
OK	9920	11	2128	0.361	69.748
ON	9923	5	2133	0.164	69.912
OP	9925	32	2165	1.049	70.960
OQ	9926	3	2168	0.098	71.059
OR	9927	872	3040	28.581	99.639
OV	9931	4	3044	0.131	99.771
OW	9932	3	3047	0.098	99.869
OZ	9935	4	3051	0.131	100.000

NOTE: THE SYMBOL "_" MEANS; CODE NOT REPORTED.

TABLE XVIII

Discriminant Analysis Results

(Variable Prior Probabilities)

PRIOR PROBABILITY OF SUCCESS	FAILURE	MODEL HIT RATE(%)	VALIDATION HIT RATE(%)
.71	.29	70.9	71.7
.70	.30	70.9	71.7
.65	.35	70.7	70.5
.61	.39	68.5	67.3
.60	.40	67.2	65.4
.50	.50	39.8	40.6

APPENDIX B

VARIABLE LABEL DEFINITIONS

ENTRYAGE=Age of Individual at Time of Entry

CHYEC=Highest Year of Education Completed

AFQTPCNT=AFQT Percentile (or equivalent)

ASVABGI=Asvab Aptitude Area Score--Subscale GI

ASVABNO=Asvab Aptitude Area Score--Subscale NO

ASVABAD=Asvab Aptitude Area Score--Subscale AD

ASVABWK=Asvab Aptitude Area Score--Subscale WK

ASVABAR=Asvab Aptitude Area Score--Subscale AR

ASVABSP=Asvab Aptitude Area Score--Subscale SP

ASVABMK=Asvab Aptitude Area Score--Subscale MK

ASVABEI=Asvab Aptitude Area Score--Subscale EI

ASVABMC=Asvab Aptitude Area Score--Subscale MC

ASVABGS=Asvab Aptitude Area Score--Subscale GS

ASVABSI=Asvab Aptitude Area Score--Subscale SI

ASVABAI=Asvab Aptitude Area Score--Subscale AI

TERMENLT=Term of Enlistment (No. of Years)

ENTRPAYG=Entry Pay Grade (E00--011)

MRTSTAT1=Marital Status (1, Other, 2, Married)

NDPNDT1=Number of Dependents (1, None)

MNTHSDEP=Months in Delayed Entry Program

HYPAYGRD=Highest Pay Grade

SCREEN=Screen Score

DEPEND=Number of Dependents

APPENDIX C

SAS PROGRAM TO CREATE HT FILE

```
//LEVERETT JOB (2720,0171),'LEVERETT',CLASS=K
//*MAIN ORG=NPGVM1.2720P
//   EXEC SAS
//SAS.WORK DD SPACE=(CYL,(10,10))
//FILEIN DD UNIT=3400-5,VOL=SER=ENLIST,
//  DISP=OLD,DSN=ENLST.ALL.A7678
//FILEOUT DD UNIT=333v,MSVGP=PUB4B,DISP=(NEW,CATLG,DELETE),
//        DSN=MSS.S2720.NRATEHT,
//            DCB(blksize=6400)
//SYS DD *
/*
//
```

APPENDIX D

SAS PROGRAM TO SCREEN PERSONNEL NOT DESIRABLE FOR ANALYSIS

```
//LEVERETT JOB (2720.0171),'LEVERETT',CLASS=C
//MAIN ORG=NPGVM1.2720P
//   EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.NRATE
//FILEOUT DD UNIT=3330V.MSVGP=PUB4Z,DISP=(NEW,CATLG),
//   DSN=MSS.S2720.HTSCREEN,DCB=(BLKSIZE=6400)
//SYSIN DD *
DATA FILEOUT.HTSCREEN;SET FILEIN.NRATEHT
KEEP=0;
IF(ISC3 EQ 32) THEN KEEP=9;
IF(ISC3 EQ 50) THEN KEEP=9;
IF(ISC3 EQ 94) THEN KEEP=9;
IF((ISC3 GE 10) AND (ISC3 LE 16)) THEN KEEP=9;
IF((ISC3 GE 40) AND (ISC3 LE 42)) THEN KEEP=9;
IF(ISC3 EQ 22) THEN KEEP=9;
IF KEEP NE 9;
/*
//
```

APPENDIX E

SAS PROGRAM TO CREATE DATA FILE FOR MODEL 1

```
//LEVERETT JOB (2720,0171),'LEVERETT',CLASS=A
//MAIN ORG=NPGVM1.2720P
//   EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.HTSCREEN
//FILEOUT DD UNIT=3330V,MSVGP=PUB4A,DISP=(NEW,CATLG),
//   DSN=MSS.S2720.HTSTART2
//SYSIN DD *
DATA FILEOUT.HTSTART2;
SET FILEIN.HTSCREEN;
IF(RCPGSCRT EQ 4300);
/*
//
```

APPENDIX F

SAS PROGRAM TO CREATE DATA FILE FOR MODEL2

```
//LEVERETT JOB (2720,0171)'LEVERETT',CLASS=C
//MAIN ORG+NPGVM1.2720P
//   EXEC SAS
//FILEIN DD DISP+SHR,DSN+MSS.S2720.HTSCREEN
//FILEOUT DD UNIT=3330VMSVGP=PUB4Z,DISP=(NEW,CATLG),
//   DSN=MSS.S2720.HTENDED2,DCB=(BLKSIZE=6400)
//SYSIN DD *
DATA FILEOUT.HTENDED2;SET FILEIN.HTSCREEN;
IF(DMDCRATE EQ 'HT');
IF(RCPGSCRT NE '4300');
/*
//
```

APPENDIX G

SAS PROGRAM FOR STEPWISE DISCRIMINANT ANALYSIS

MODEL 1

```
//LEVERETT JOB (2720,0171),'SMC 1965',CLASS=C
//*MAIN ORG=NPGVM1.2720P
//  EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.HTSTART2
//SYSIN DD *
DATA CORRECT;SET FILEIN.HTSTART2;
            IF HYEC=1 THEN CHYEC=3.5;
            IF HYEC=2 THEN CHYEC=8;
            IF HYEC=3 THEN CHYEC=9;
            IF HYEC=4 THEN CHYEC=10;
            IF HYEC=5 THEN CHYEC=11;
            IF HYEC=6 THEN CHYEC=12;
            IF HYEC=7 THEN CHYEC=13;
            IF HYEC=8 THEN CHYEC=14;
            IF HYEC=9 THEN CHYEC=15;
            IF HYEC=10 THEN CHYEC=16;
            IF HYEC=11 THEN CHYEC=18;
            IF HYEC=12 THEN CHYEC=20;
            IF HYEC=13 THEN CHYEC=11.5;
            HYEC=CHYEC;
IF(RCPGSCRT EQ '4300')
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
```

```
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=1;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=2;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF CATEGORY=1 THEN C1=1;
IF CATEGORY=2 THEN C1=.;
IF CATEGORY=3 THEN C1=2;
DATA DERIV8;SET CORRECT;IF DVSMPL01=1;
DATA VALID8;SET CORRECT;IF DVSMPL01=0;
PROC FREQ DATA=CORRECT;TABLES C1;
PROC FREQ DATA=DERIV8;TABLES C1;
PROC FREQ DATA=VALID8;TABLES C1;
PROC STEPDISC DATA=DERIV8 SIMPLE STDMEAN TCORR WCORR; VAR
      SASVABGI SASVABNO SASVABAD SASVABWK SASVABAR SASVABSP SASVABWK
      SASVABEI SASVABMC SASVABGS SASVABSI SASVABAI SCREEN ENTRPAYG
      MRTLDPND AFQTPCNT;
CLASS C1;
/*
//
```

APPENDIX H

SAS PROGRAM FOR DISCRIMINANT ANALYSIS

MODEL 1

```
//LEVERET JOB (2720,0171),'LEVERET SMC 1965',CLASS=B
//*MAIN ORG=NPGVM1.2720P
//  EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.HTSTART2
//SYSIN DD *
DATA CORRECT; SET FILEIN.HTSTART2;
            IF HYEC=1 THEN CHYEC=3.5;
            IF HYEC=2 THEN CHYEC=8;
            IF HYEC=3 THEN CHYEC=9;
            IF HYEC=4 THEN CHYEC=10;
            IF HYEC=5 THEN CHYEC=11;
            IF HYEC=6 THEN CHYEC=12;
            IF HYEC=7 THEN CHYEC=13;
            IF HYEC=8 THEN CHYEC=14;
            IF HYEC=9 THEN CHYEC=15;
            IF HYEC=10 THEN CHYEC=16;
            IF HYEC=11 THEN CHYEC=18;
            IF HYEC=12 THEN CHYEC=20;
            IF HYEC=13 THEN CHYEC=11.5;
            HYEC=CHYEC;
IF(RCPGSCRT EQ '4300')
THEN CATEGCRY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
```

```
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=1;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 3039))
THEN CATEGORY=2;
IF CATEGORY=1 THEN C1=1;
IF CATEGORY=2 THEN C1=.;
IF CATEGORY=3 THEN C1=2;
DATA DERIV8;SET CORRECT;IF DVSMPL01=1;
DATA VALID8;SET CORRECT;IF DVSMPL01=0;
PROC DISCRIM S POOL=YES DATA=DERIV8 OUT=MODEL;VAR
SCREEN ENTRPAYG AFQTPCNT SASVABNO SASVABMC;
PRIORS 1=.61 2=.39;
CLASS C1;
PROC DISCRIM DATA=MODEL TESTDATA=VALID8;TESTCLASS C1;
/*
//
```

APPENDIX I

SAS PROGRAM FOR STEPWISE DISCRIMINANT ANALYSIS

MODEL 2

```
//LEVERETT JOB (2720,0171),'SMC 1965',CLASS=C
//*MAIN ORG=NPGVM1.2720P
//  EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.HTENDED2
//SYSIN DD *
DATA CORRECT;SET FILEIN.HTENDED2;
            IF HYEC=1 THEN CHYEC=3.5;
            IF HYEC=2 THEN CHYEC=8;
            IF HYEC=3 THEN CHYEC=9;
            IF HYEC=4 THEN CHYEC=10;
            IF HYEC=5 THEN CHYEC=11;
            IF HYEC=6 THEN CHYEC=12;
            IF HYEC=7 THEN CHYEC=13;
            IF HYEC=8 THEN CHYEC=14;
            IF HYEC=9 THEN CHYEC=15;
            IF HYEC=10 THEN CHYEC=16;
            IF HYEC=11 THEN CHYEC=18;
            IF HYEC=12 THEN CHYEC=20;
            IF HYEC=13 THEN CHYEC=11.5;
            HYEC=CHYEC;
IF((DMDCRATE EQ 'HT') AND (RCPGSCRT NE '4300'))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
```

```
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=1;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=2;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF CATEGORY=1 THEN C1=1;
IF CATEGORY=2 THEN C1=.;
IF CATEGORY=3 THEN C1=2;
DATA DERIV8;SET CORRECT;IF DVSMPL01=1;
DATA VALID8;SET CORRECT;IF DVSMPL01=0;
PROC FREQ DATA=CORRECT;TABLES C1;
PROC FREQ DATA=DERIV8;TABLES C1;
PROC FREQ DATA=VALID8;TABLES C1;
PROC STEPDISC DATA=DERIV8 SIMPLE STDMEAN TCORR WCORR; VAR
      SASVABGI SASVABNO SASVABAD SASVABWK SASVABAR SASVABSP SASVABWK
      SASVABEI SASVABMC SASVABGS SASVABSI SASVABAI SCREEN ENTRPAYG
      MRTLDPND AFQTPCNT;
CLASS C1;
/*
//
```

APPENDIX J

SAS PROGRAM FOR DISCRIMINANT ANALYSIS

MODEL 2

```
//LEVERET JOB (2720,0171),'LEVERET SMC 1965',CLASS=B
//*MAIN ORG=NPGVM1.2720P
//  EXEC SAS
//FILEIN DD DISP=SHR,DSN=MSS.S2720.HTENDED2
//SYSIN DD *
DATA CORRECT; SET FILEIN.HTENDED2;
            IF HYEC=1 THEN CHYEC=3.5;
            IF HYEC=2 THEN CHYEC=8;
            IF HYEC=3 THEN CHYEC=9;
            IF HYEC=4 THEN CHYEC=10;
            IF HYEC=5 THEN CHYEC=11;
            IF HYEC=6 THEN CHYEC=12;
            IF HYEC=7 THEN CHYEC=13;
            IF HYEC=8 THEN CHYEC=14;
            IF HYEC=9 THEN CHYEC=15;
            IF HYEC=10 THEN CHYEC=16;
            IF HYEC=11 THEN CHYEC=18;
            IF HYEC=12 THEN CHYEC=20;
            IF HYEC=13 THEN CHYEC=11.5;
            HYEC=CHYEC;
IF(DMDCRATE EQ 'HT') AND (RCPGSCRT NE '4300))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
```

```
THEN CATEGORY=3;
IF((NOTRCMD=1) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV LT 0309))
THEN CATEGORY=3;
IF((NOTRCMD=0) AND (HYPAYGRD GE 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=1;
IF((NOTRCMD=0) AND (HYPAYGRD LT 4) AND (LNGTHSRV GE 0309))
THEN CATEGORY=2;
IF CATEGORY=1 THEN C1=1;
IF CATEGORY=2 THEN C1=.;
IF CATEGORY=3 THEN C1=2;
DATA DERIV8;SET CORRECT;IF DVSMPL01=1;
DATA VALID8;SET CORRECT;IF DVSMPL01=0;
PROC DISCRIM S POOL=YES DATA=DERIV8 OUT=MODEL;VAR
SCREEN ENTRPAYG AFQTPCNT SASVABSI;
PRIORS 1=.71 2=.29;
CLASS C1;
PROC DISCRIM DATA=MODEL TESTDATA=VALID8;TESTCLASS C1;
/*
//
```

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